$$T = \frac{1}{50} = 2.10^{-2}s$$

$$\frac{t_1}{T} = \frac{4,5.10^{-2}}{2.10^{-2}} = 2,25$$

$$t_1 = 2,25T$$

$t_1 < \theta \Rightarrow$ **Le point M_4 est au repos d'où** $y_{M_4} = 0$

et $V_{M_4} = 0$

$t_2 = 8.10^{-2}s = 4T$ d'après la courbe $y_{M_4}(t)$

$y_{M_4} = 0$ **et** $V_{M_4} = -a\omega = -0,3\pi m.s^{-1}$

5°)

a- $t_3 = 7,5.10^{-2}s = 3,5T$

La distance parcourue par l'onde pendant t_3

$x_f = d = v.t_3 = v.3,5T = 3,5\lambda$

Donc $y_{t_3}(x) = a\sin\left(\omega t_3 - \frac{2\pi x}{\lambda}\right) \quad \forall x \le d$

$= a\sin\left(100\pi t_3 - \frac{2\pi x}{\lambda}\right) \quad \forall x \le d$

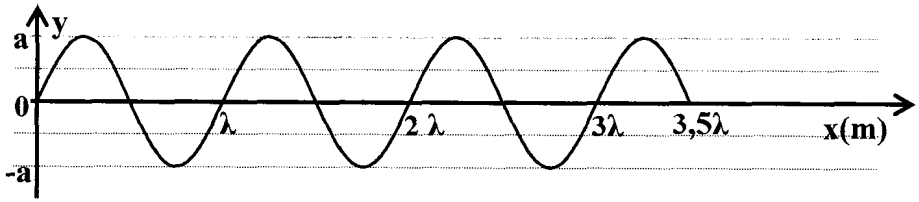
$= a\sin\left(\pi - \frac{2\pi x}{\lambda}\right) \quad \forall x \le d$

$= a\sin(\pi - 12,5\pi x) \quad \forall x \le d$

$y_{t_3}(x) = 3.10^{-3}\sin(\pi - 12,5\pi x) \quad \forall x \le 3,5\lambda$

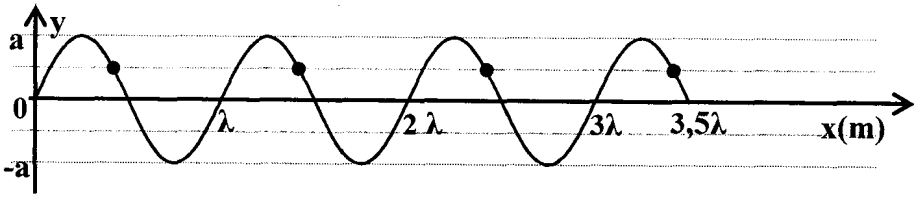
$\Rightarrow y_{t_3}(x) = 3.10^{-3}\sin(12,5\pi x) \quad \forall x \le 3,5\lambda$

b-



c-

$$\begin{cases} y = \frac{a}{2} \\ \frac{dy}{dt} > 0 \Rightarrow \frac{dy}{dx} < 0 \end{cases}$$



d- $V = \omega\sqrt{a^2 - y^2} = \omega\sqrt{a^2 - \left(\frac{a}{2}\right)^2} = a\omega\frac{\sqrt{3}}{2} = 0,3\frac{\sqrt{3}}{2}\pi m.s^{-1}$